Project	**IEEE 802.20 Working Group on Mobile Broadband Wireless Access** **<http://grouper.ieee.org/groups/802/20/>**	
Title	**LDPC Code Proposal – Technology Specification**	
Date Submitted	**2007-03-05 (March 5, 2007)**	
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Re:	IEEE 802.20 Call for Proposals	
Abstract	This document proposes an LDPC coding scheme for Mobile Broadband Wireless Access Systems.	
Purpose	To provide detail specification text for LDPC coding in 802.20 standard draft.	
Notice		
Release		
Patent Policy		

Introduction

The current version of 802.20 air interface standard draft [1] supports two basic channel coding schemes, namely, a rate 1/5 Parallel Concatenated Convolutional Code (PCCC) i.e. Turbo codes and a rate 1/3 Convolutional Code (CC). The rate 1/5 Turbo codes shall be used for number of information bits *k* larger than 128, while the rate 1/3 Convolutional Code shall be used for values of *k* less than or equal to 128. We propose hereafter to include an optional Low-Density Parity-Check (LDPC) coding scheme for high data rates. The proposed LDPC codes offer both efficient support of Type II HARQ (Incremental Redundancy) together with similar or better performances than Turbo codes through all HARQ retransmissions. Besides, this proposed code structure enables highly parallelizable decoder architectures, thus resulting in high-throughput decoder implementations.

LDPC codes are fully defined by their sparse parity-check matrices, and can also be represented by a Tanner Graph, a bipartite graph illustrating the constraints of the code. Such graph consists first of two types of nodes namely variable nodes and check nodes, then of edges which connect those two types of nodes. Variable nodes represent bits in the codeword, but they can also contain some punctured bits that are not transmitted on the channel. Check nodes represent the constraints that define the code: the set of variable nodes connected to any given check node is constrained to sum to zero.

LDPC codes can be decoded by Message-Passing based algorithms. One of them is the Pearl's Belief-Propagation (BP) algorithm which passes beliefs in the form of Log-Likelihood Ratios (LLR) along the edges of the bipartite graph. Although optimal only for tree structure codes (cycle free), near optimal performances are usually obtained. Moreover, the complexity of BP algorithm is proportional to the number of edges in the graph. Due to the sparseness of the parity-check matrix, and thus of the corresponding bipartite graph, the resulting decoding complexity is quite affordable.

Features of the proposed LDPC code

The proposed LDPC code has excellent performance, and contains features that provide packet length flexibility whilst maintaining low encoding and decoding complexity. Besides, it enables the support of Incremental Redundancy (IR) HARQ.

- **Structured LDPC code**. The entire parity-check matrix (i.e., both the sections that correspond to the information and parity bits) is composed of the same style of blocks which are either cyclic permutation matrices or zero matrices. This reduces decoder implementation complexity and allows structured decoding.
- **Code length flexibility**. The shift values for each block size are derived from the matrix of the largest allowable block size. This facilitates compact representation of parity-check matrices, thus resulting in memory storage savings, together with efficient implementations of the encoder and decoder parts.
- **Multi-Edge-Type LDPC code**. Parity-check matrix contains several types of edges including punctured information nodes and degree-one parity nodes. The punctured information nodes give higher noise thresholds with lower degrees, resulting in performance and complexity improvement. The degree-one parity nodes are very convenient for HARQ
- **Efficient Encoding**. The combination of Richardson & Urbanke's encoding algorithm and simple single parity-check coding facilitates efficient encoding.
- **HARQ support**. First, the lowest code-rate multi-edge-type parity-check matrix is designed to support HARQ. Then only a part of codeword (puncturing) is transmitted during each HARQ transmission (Incremental Redundancy). In other words, higher rate codes are achieved by puncturing parity bits from the lower rate codes. As a consequence, such LDPC codes are thus Rate-Compatible Punctured Codes (RCPC), suitable for IR Type II HARQ.

Recommended Text Changes:

Modify the text in IEEE 802.20/D2.1 as follows, adjusting the section numbering as required:

<Replace the contents of section 9.2.2 (p.559 line 24 to 26) with the following text.>
The air interface shall support 2 mandatory coding schemes, namely a rate 1/5 parallel turbo code and a rate 1/3 convolutional code, together with an optional Rate Compatible LDPC Code. The LDPC code shall be used for high data rates (values of k larger than 512), and the rate 1/5 turbo code shall be used for values of k larger than 128, while the rate 1/3 convolutional code shall be used for values of k less than or equal to 128.

<Add the following section to the end of section 9.2.2.2.>
9.2.2.3 LDPC encoding

The core LDPC codes are systematic structured LDPC codes. The parity-check matrix of the structured LDPC code is lifted from a small base parity-check matrix of size m x n. Each non-zero element in the base parity-check matrix is replaced by an L x L cyclic permutation matrix which can be expressed by the powers of a matrix P defined by

$$P = \begin{bmatrix} 0 & 1 & 0 & \cdots & 0 \\ 0 & 0 & 1 & \cdots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \cdots & 1 \\ 1 & 0 & 0 & \cdots & 0 \end{bmatrix}.$$

A base model matrix is defined for the lowest code rate that enables support of Incremental Redundancy (IR) HARQ. One parity-check matrix is used for each packet format defined at Table 73 in section 7.5.6.7 and Table 95 in section 7.7.6.8 respectively.
Variable code lengths are supported by increasing or decreasing the size of cyclic permutation matrix. Assuming that (i, j)-th element in base matrix is non-zero. Then shift value $p(f, i, j)$ corresponding to the expansion factor L_f is derived from the original shift value $p(i, j)$ by using a modulo function $p(f, i, j) = \text{mod}\,(p(i, j)\,, L_f\,)$.

The parity-check matrix of structured LDPC codes is compactly represented by degrees, positions and shift values of non-zero elements in base matrix. The format for representing parity-check matrix is given in Table 98. Since the LDPC codes are systematic codes, information bits are always located in the left of the parity-check matrix, whereas parity bits are located in the right side. Note that some columns will be punctured before transmission and that position of the punctured columns is always leftmost. To support IR HARQ, only a part of codeword is transmitted during each HARQ transmission serially from left to right of the codeword corresponding to the lowest rate parity-check matrix.

Table 98 Parity-check matrix format

<table>
<tr><td colspan="2">Number of columns, Number of rows, Number of punctured columns</td></tr>
<tr><td colspan="2">Column degrees</td></tr>
<tr><td colspan="2">Row degrees</td></tr>
<tr><td>Positions of non-zero block in rows</td><td>Shift values of non-zero block in rows</td></tr>
</table>

Table 99a Parity-check matrix for FL PFI 00

121 110 11			
21 21 21 21 21 21 21 21 21 21 21 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 3 3 3 3 4 4 4 4 4 4 4 3 3 3 3 4 4 4 4 4 4 4 3 3 3 3 4 4 4 4 4 4 4 3 3 3 3 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 4 4 4 3 3 3 3 3 4 4 4 4 4 4			
0 11 12	3 9 66	9 1 0	6 8 0
1 12 13	4 10 67	3 0 0	9 0 0
2 13 14	1 2 68	7 0 0	8 0 0
3 14 15	1 7 69	3 0 0	12 11 0
4 15 16	1 4 8 70	3 0 0	0 11 1 0
5 16 17	2 5 9 71	10 0 0	11 1 0 0
6 17 18	2 6 10 72	14 0 0	1 2 0 0
7 18 19	2 3 8 73	7 0 0	10 1 0 0
8 19 20	2 4 9 74	3 0 0	5 14 0 0
9 20 21	2 5 10 75	10 0 0	7 14 5 0
10 21 22	2 3 6 76	0 0 0	0 10 3 0
0 22 23	4 7 77	2 0 0	6 0 0
1 23 24	5 8 78	1 0 0	13 0 0
2 24 25	2 9 79	12 0 0	0 14 0
3 25 26	3 7 80	3 0 0	6 0 0
4 11 26 27	3 4 9 81	5 0 0 0	1 5 0 0
5 27 28	3 5 10 82	5 0 0	13 15 0 0
6 28 29	3 4 6 83	10 0 0	8 2 0 0
7 29 30	3 5 7 84	1 0 0	13 1 0 0
8 30 31	3 6 8 85	0 0 0	3 1 0 0
9 31 32	3 7 9 86	5 0 0	3 11 0 0
10 32 33	4 8 10 87	0 0 0	14 3 0 0
0 33 34	5 6 88	0 0 0	1 0 0
1 34 35	6 7 89	0 0 0	2 0 0
2 35 36	4 7 90	2 0 0	3 0 0
3 36 37	4 8 91	3 0 0	1 0 0
4 37 38	5 9 10 92	2 0 0	12 2 14 0
5 38 39	5 6 8 93	0 0 0	10 3 0 0
6 39 40	5 7 9 94	2 0 0	15 4 0 0
7 40 41	5 8 10 95	0 0 0	0 0 0 0
8 41 42	6 7 10 96	2 0 0	15 4 0 0
9 42 43	7 9 10 97	0 0 0	1 8 0 0
10 11 43	8 9 10 98	0 1 0	6 1 0 0
1 2 44	0 7 99	7 5 0	3 0 0
3 4 45	0 8 100	7 12 0	6 0 0
0 6 46	0 9 101	2 14 0	0 0 0
0 8 47	0 10 102	1 0 0	0 6 0
0 9 10 48	1 3 103	13 3 0 0	8 8 0
0 1 3 49	1 5 104	13 5 2 0	1 13 0
0 2 4 50	1 9 105	6 2 8 0	0 1 0
0 3 5 51	1 10 106	3 13 8 0	6 0 0
0 4 6 52	2 4 10 107	7 15 0 0	12 3 0 0
0 5 7 53	2 5 9 108	10 5 0 0	0 0 0 0
0 6 8 54	2 6 8 109	0 7 0 0	4 6 8 0
0 9 55	2 7 110	3 2 0	6 0 0
0 10 56	3 8 111	15 0 0	4 0 0
0 1 57	3 9 112	15 0 0	0 0 0
0 2 58	3 10 113	5 2 0	0 0 0
0 1 2 59	4 5 114	14 9 0 0	11 15 0
1 3 6 60	4 7 8 115	14 9 0 0	4 0 0 0
1 4 7 61	4 6 10 116	3 9 0 0	0 0 0 0
1 5 8 62	4 5 7 117	13 3 0 0	8 2 0 0
1 6 9 63	5 6 7 118	5 2 8 0	0 8 0 0
1 7 10 64	2 6 8 119	12 2 0 0	0 0 0 0
1 2 8 65	1 6 9 120	0 9 0 0	0 0 0 0

Table 99b Parity-check matrix for FL PFI 01, RL PFI 01

48 37 4	
9 9 9 9 9 9 9 9 9 9 9 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
5 5 4 5 5 4 5 6 4 4 4 4 5 4 5 5 4 4 4 4 4 4 4 4 3 3 3 3 3 4 4 4 4 4 4 4 4	
0 4 6 11 12	25 15 9 1 0
1 5 7 12 13	16 3 20 0 0
2 10 13 14	34 6 0 0
3 6 9 14 15	23 0 7 0 0
0 5 8 15 16	15 8 3 0 0
1 7 16 17	7 32 0 0
2 4 9 17 18	9 2 30 0 0
3 5 10 11 18 19	24 0 0 0 0 0
0 8 19 20	1 0 0 0
1 4 20 21	6 29 0 0
2 10 21 22	7 2 0 0
3 9 22 23	5 26 0 0
0 6 7 23 24	20 8 6 0 0
1 8 24 25	20 20 0 0
2 6 7 25 26	0 30 0 0 0
3 4 5 11 26	11 0 0 1 0
8 9 10 27	2 22 25 0
0 5 8 28	29 1 0 0
1 4 7 29	37 7 20 0
2 6 10 30	21 0 14 0
3 5 9 31	0 14 0 0
0 4 6 32	25 7 0 0
1 7 10 33	21 10 19 0
2 8 9 34	0 38 20 0
3 4 35	39 39 0
0 5 36	29 0 0
1 6 37	11 0 0
2 7 38	4 36 0
3 8 39	28 0 0
0 5 9 40	13 0 0 0
1 9 10 41	14 3 0 0
2 5 6 42	24 0 0 0
3 7 8 43	37 21 0 0
0 9 10 44	6 0 6 0
1 4 6 45	0 9 0 0
2 8 10 46	0 24 0 0
3 4 7 47	35 2 20 0

Table 99c Parity-check matrix for FL PFI 02, RL PFI 02

70 59 4	
13 13 14 14 11 12 12 11 12 12 12 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
4 3 3 3 3 4 3 4 3 3 3 3 4 4 4 3 3 3 3 4 3 4 3 3 4 4 4 4 4 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	
0 8 11 12	43 3 1 0
4 12 13	79 0 0
1 13 14	52 0 0
9 14 15	29 0 0
5 15 16	18 0 0
2 10 16 17	18 5 0 0
6 17 18	53 0 0
3 7 18 19	78 11 0 0
8 19 20	60 0 0
0 20 21	72 0 0
5 21 22	32 0 0
10 22 23	10 0 0
1 6 23 24	20 64 0 0
3 11 24 25	1 0 0 0
0 4 25 26	30 41 0 0
7 26 27	7 0 0
2 27 28	48 0 0
8 28 29	0 0 0
9 29 30	4 0 0
1 4 30 31	35 0 0 0
6 31 32	0 0 0
2 5 32 33	3 20 0 0
7 33 34	0 0 0
9 34 35	0 0 0
3 10 11 35	60 0 1 0
0 1 2 36	78 5 7 0
1 2 3 37	48 75 1 0
0 2 3 38	55 7 60 0
0 1 3 39	3 16 0 0
0 6 7 9 40	66 19 0 12 0
1 8 10 41	54 77 0 0
2 4 9 42	59 26 0 0
3 4 5 43	0 37 73 0
0 7 10 44	63 74 7 0
1 4 10 45	8 16 0 0
2 5 10 46	25 77 0 0
3 6 10 47	74 3 0 0
0 8 9 48	0 19 0 0
1 5 8 49	64 9 0 0
2 4 7 50	2 31 0 0
3 4 8 51	68 48 0 0
0 5 6 52	67 0 5 0
1 7 9 53	50 0 17 0
2 6 8 54	14 1 0 0
3 5 7 55	0 68 0 0
2 5 9 56	69 0 14 0
3 6 9 57	0 35 0 0
0 4 10 58	0 27 0 0
1 5 6 59	0 74 18 0
2 6 7 60	0 30 0 0
3 5 7 61	4 51 49 0
0 5 9 62	16 39 0 0
1 7 10 63	0 43 0 0
2 4 8 64	0 15 0 0
3 8 10 65	23 0 15 0
0 6 8 66	0 59 0 0
1 8 9 67	0 0 40 0
2 6 10 68	0 52 0 0
3 4 9 69	0 0 40 0

Table 99d Parity-check matrix for FL PFI 03, RL PFI 03

95 80 5			
16 17 17 16 16 13 13 13 13 13 13 13 13 13 13 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
4 4 4 3 4 4 3 4 4 3 4 5 4 4 3 4 4 4 4 3 4 4 4 4 4 5 5 4 4 4 4 4 4 4 4 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 4 4 4 4 4 4 4 4 4 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4			
0 8 15 16	3 6 10 55	57 5 1 0	0 21 0 0
6 7 16 17	4 6 12 56	47 48 0 0	15 58 0 0
1 10 17 18	0 7 9 57	60 5 0 0	0 64 0 0
8 18 19	1 6 14 58	15 0 0	16 66 0 0
3 9 19 20	2 7 14 59	17 46 0 0	0 33 70 0
2 13 20 21	3 13 14 60	4 7 0 0	35 34 0 0
12 21 22	4 8 9 61	14 0 0	37 78 0 0
4 11 22 23	0 8 11 62	14 1 0 0	0 18 0 0
3 8 23 24	1 8 12 63	44 0 0 0	13 42 0 0
14 24 25	2 8 13 64	15 0 0	38 0 22 0
0 5 25 26	3 9 14 65	51 57 0 0	39 69 0 0
4 5 15 26 27	4 10 13 66	0 24 0 0 0	12 0 40 0
9 12 27 28	4 11 12 67	6 5 0 0	4 0 0 0
0 14 28 29	1 4 6 13 68	8 7 0 0	2 45 61 0 0
6 29 30	2 5 7 12 69	60 0 0	16 73 0 0 0
2 13 30 31	3 8 11 14 70	19 29 0 0	0 1 23 0 0
1 12 31 32	0 7 10 71	7 72 0 0	0 74 2 0
7 10 32 33	1 8 11 72	54 5 0 0	0 61 5 0
4 11 33 34	2 9 12 73	32 11 0 0	18 81 0 0
9 34 35	3 10 13 74	0 0 0	6 0 0 0
1 6 35 36	4 11 14 75	18 0 0 0	0 56 0 0
3 7 36 37	0 5 12 76	0 0 0 0	35 80 0 0
5 13 37 38	1 6 13 77	0 0 0 0	43 1 0 0
10 14 38 39	2 6 7 78	59 0 0 0	3 25 0 0
2 11 15 39	3 5 9 79	0 0 1 0	0 59 0 0
0 1 5 6 40	1 14 80	22 41 32 0 0	61 0 0
1 2 7 8 41	2 13 81	6 44 45 0 0	0 0 0
2 3 9 42	0 10 82	26 34 0 0	6 0 0
3 4 10 43	4 9 83	63 0 0 0	0 0 0
0 4 11 44	8 12 84	53 12 0 0	0 0 0
0 2 12 45	0 8 10 85	39 0 0 0	36 48 10 0
1 3 13 46	1 9 11 86	54 69 0 0	0 78 8 0
2 4 14 47	2 10 12 87	20 44 0 0	39 30 0 0
0 3 5 48	3 11 13 88	0 61 0 0	12 73 0 0
1 4 6 49	4 12 14 89	5 0 0 0	6 0 16 0
0 1 9 10 50	0 5 13 90	51 0 27 0 0	15 79 0 0
2 3 7 11 51	1 6 14 91	27 19 82 0 0	86 54 24 0
0 5 10 52	2 5 7 92	0 14 0 0	2 49 0 0
1 5 11 53	3 6 8 93	0 5 66 0	0 72 0 0
2 5 7 54	4 7 9 94	10 41 0 0	0 47 36 0

Table 99e Parity-check matrix for FL PFI 04

154 132 11			
16 17 17 17 17 17 17 17 16 16 16 14 14 15 14 14 15 15 15 14 15 15 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
5 5 5 4 5 5 5 4 5 4 3 4 3 4 4 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 4 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 3 3 3 3 3 4 4 4 4 4 4 4 3 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3			
0 5 13 22 23	6 10 21 88	64 20 47 1 0	34 0 0 0
1 6 17 23 24	1 10 14 89	23 9 15 0 0	77 4 0 0
2 10 15 24 25	1 5 17 90	2 71 33 0 0	19 21 0 0
8 21 25 26	7 9 20 91	12 0 0 0	68 42 0 0
4 9 14 26 27	0 5 11 92	39 70 3 0 0	67 27 5 0
0 7 18 27 28	2 4 18 93	6 2 18 0 0	20 0 12 0
3 10 16 28 29	3 8 13 94	65 23 9 0 0	31 8 0 0
9 11 29 30	7 8 19 95	53 20 0 0	7 0 18 0
6 12 19 30 31	3 4 12 96	50 41 7 0 0	2 10 0 0
1 16 31 32	5 7 13 21 97	59 15 0 0	18 0 17 29 0
7 32 33	2 6 14 19 98	1 0 0	42 0 0 7 0
3 20 33 34	8 11 99	18 0 0 0	4 9 0
5 34 35	4 12 100	34 0 0	77 0 0
4 17 35 36	0 20 101	33 4 0 0	56 9 0
13 22 36 37	9 14 102	17 0 0 0	56 0 0
1 12 37 38	10 16 103	0 7 0 0	37 0 0
19 38 39	3 6 15 104	0 0 0	45 40 3 0
6 17 39 40	1 9 21 105	0 0 0 0	26 0 20 0
13 40 41	3 8 13 106	0 0 0	57 32 0 0
2 11 41 42	1 10 18 107	0 1 0 0	67 73 0 0
15 42 43	2 5 19 108	4 0 0	40 18 0 0
7 21 43 44	4 7 17 109	15 10 0 0	41 56 0 0
20 44 45	6 13 17 110	18 0 0	59 12 14 0
0 14 45 46	2 20 111	11 2 0 0	9 41 0
18 46 47	9 15 16 112	5 0 0	50 0 0 0
3 21 47 48	7 17 18 113	0 0 0 0	39 26 0 0
16 48 49	4 12 21 114	0 0 0	72 30 0 0
5 18 49 50	10 16 18 115	0 8 0 0	64 0 74 0
20 50 51	1 20 116	0 0 0	57 18 0
8 14 51 52	5 11 117	51 0 0 0	47 0 0
12 52 53	8 15 118	0 0 0	46 0 0
2 15 53 54	0 14 119	71 0 0 0	31 0 0
9 54 55	3 19 120	0 0 0	77 0 0
4 11 55 56	6 11 121	64 0 0 0	12 21 0
8 56 57	9 21 122	0 0 0	13 6 0
10 19 22 57	3 13 123	12 0 1 0	53 0 0
0 4 10 58	7 18 124	53 16 9 0	30 19 0
1 7 8 59	4 12 125	29 12 12 0	19 53 0
2 5 9 60	0 19 126	20 0 3 0	1 0 0
3 4 6 61	5 16 20 127	58 0 0 0	59 0 54 0
0 5 7 62	1 16 20 128	40 10 0 0	52 20 0 0
2 6 10 63	8 14 18 129	10 9 0 0	23 16 0 0
1 4 7 64	10 17 21 130	45 0 0 0	55 5 65 0
3 6 9 65	2 15 17 131	40 0 41 0	48 4 0 0
1 2 5 66	3 7 11 14 132	64 35 34 0	59 0 71 74 0
0 3 8 67	5 6 13 19 133	8 40 0 0	14 66 3 0 0
1 8 13 19 68	0 2 16 21 134	10 7 0 12 0	25 18 7 79 0
6 10 12 16 69	6 9 11 20 135	1 66 13 0 0	0 20 0 46 0
0 12 13 70	1 7 17 21 136	25 19 75 0	70 50 0 12 0
5 7 11 17 71	0 4 14 18 137	28 19 34 4 0	50 4 27 0 0
2 9 14 21 72	8 10 15 20 138	33 6 54 0 0	11 33 29 0 0
4 11 18 73	1 3 12 17 139	74 33 0 0	49 66 54 64 0
3 15 20 74	9 10 16 18 140	10 6 0 0	11 50 0 23 0
5 12 18 75	5 8 13 15 141	45 13 40 0	35 40 0 0 0
6 12 17 76	2 4 12 19 142	23 78 0 0	7 12 0 0 0
0 11 13 77	0 13 143	62 42 0 0	69 0 0
10 18 19 78	1 16 144	0 0 0 0	35 0 0
4 17 19 79	2 15 145	38 1 0 0	0 0 0
7 11 16 80	3 11 146	0 13 0 0	30 9 0
1 13 14 81	4 21 147	53 0 18 0	33 0 0
8 16 21 82	5 14 148	9 15 0 0	32 0 0
3 15 20 83	6 12 149	53 43 4 0	56 21 0
9 14 21 84	7 17 150	17 26 19 0	24 0 0
2 15 20 85	8 20 151	62 36 0 0	57 74 0
0 6 15 86	9 19 152	53 20 0 0	39 64 0
2 9 16 87	10 18 153	40 7 0 0	3 61 0

Table 99f Parity-check matrix for FL PFI 05

142 117 2			
15 14 13 13 13 13 13 14 14 14 13 13 13 12 12 12 13 13 13 13 12 12 11 12 11 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
4 4 4 4 5 5 5 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4			
0 5 25 26	7 10 16 84	58 21 1 0	17 0 37 0
2 8 26 27	8 11 17 85	0 13 0 0	28 0 24 0
3 9 27 28	9 18 86	57 31 0 0	60 0 0
6 11 28 29	10 19 87	29 14 0 0	3 8 0
4 7 10 29 30	11 20 88	46 0 20 0 0	5 22 0
1 14 18 30 31	2 21 89	41 48 6 0 0	52 0 0
12 16 20 31 32	12 16 90	15 2 0 0 0	41 13 0
13 17 21 32 33	13 17 91	54 46 11 0 0	6 0 0
15 19 33 34	14 18 92	84 3 0 0	85 0 0
0 3 12 34 35	15 19 93	26 2 7 0 0	29 0 0
4 14 23 35 36	4 12 94	53 32 0 0 0	77 0 0
1 5 22 36 37	5 13 95	73 49 2 0 0	50 55 0
2 13 24 37 38	2 22 96	53 6 0 0 0	6 70 0
0 6 17 38 39	3 23 97	22 50 10 0 0	67 0 0
8 15 18 39 40	8 16 98	18 75 45 0 0	2 0 0
1 7 16 40 41	9 17 99	86 8 70 0 0	6 0 0
9 22 25 41 42	6 18 100	4 0 0 0 0	35 0 0
0 10 19 42 43	7 19 101	60 1 35 0 0	37 0 0
2 12 21 43 44	11 20 102	37 22 44 0 0	17 14 0
1 11 23 44 45	10 21 103	27 8 0 0 0	0 18 0
3 13 20 45 46	12 14 19 104	55 0 10 0 0	27 28 0 0
0 7 15 46 47	13 15 20 105	44 28 0 0 0	27 23 0 0
5 17 24 47 48	14 16 21 106	0 0 5 0 0	64 4 0 0
1 4 16 48 49	12 15 17 107	77 0 8 0 0	87 43 0 0
6 14 22 49 50	2 16 18 108	12 0 0 0 0	63 0 67 0
0 9 18 50 51	3 17 20 109	11 0 0 0 0	65 31 13 0
11 21 24 51 52	4 18 21 110	44 0 0 0 0	72 23 35 0
1 8 19 52 53	5 19 22 111	0 0 0 0 0	48 0 16 0
10 20 23 25 53	6 20 23 112	0 0 4 1 0	37 6 0 0
0 3 12 54	7 21 24 113	84 15 50 0	56 86 0 0
1 2 13 55	7 12 22 114	72 65 0 0	2 13 0 0
0 4 14 56	8 13 23 115	69 49 0 0	52 9 66 0
1 5 15 57	9 14 24 116	80 42 0 0	23 6 0 0
0 4 6 58	10 15 24 117	44 23 0 0	23 44 29 0
1 5 7 59	11 16 23 118	43 24 69 0	30 84 71 0
0 6 8 60	2 17 119	22 30 0 0	66 0 0
1 7 9 61	3 18 120	42 75 68 0	24 0 0
0 8 10 62	4 19 121	0 53 0 0	66 0 0
1 9 11 63	5 20 122	26 15 65 0	10 0 0
0 2 10 64	6 21 123	5 23 7 0	16 30 0
1 3 11 65	12 17 22 124	0 75 41 0	72 66 0 0
2 6 16 66	13 18 23 125	24 72 72 0	61 3 0 0
3 7 17 67	14 19 24 126	78 2 5 0	9 27 0 0
4 8 18 68	8 10 15 127	59 40 0 0	60 72 0 0
5 9 19 69	9 11 16 128	81 66 81 0	57 46 0 0
6 10 20 70	12 17 22 129	67 10 66 0	38 22 4 0
7 11 21 71	13 18 23 130	49 2 0 0	16 0 0 0
2 8 22 72	14 19 24 131	45 13 0 0	25 29 0 0
3 9 23 73	7 15 20 132	19 66 0 0	0 0 8 0
4 10 24 74	8 16 21 133	12 58 0 0	20 0 17 0
5 11 75	2 9 17 134	43 0 0	54 0 0 0
0 2 6 76	3 10 18 135	19 9 0 0	80 32 0 0
3 7 22 77	4 11 19 136	72 14 0 0	84 0 59 0
4 8 23 78	5 12 20 137	2 22 0 0	81 51 0 0
5 9 24 79	6 13 21 138	20 18 0 0	22 83 26 0
0 3 12 80	7 14 22 139	61 0 8 0	39 44 5 0
1 4 13 81	8 15 23 140	42 5 83 0	68 0 0 0
0 5 14 82	9 16 24 141	36 7 0 0	32 0 0 0
1 6 15 83		13 77 0 0	

Table 99g Parity-check matrix for FL PFI 06

95 80 5			
23 23 22 23 23 11 11 11 11 11 11 11 11 11 11 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
4 4 5 4 4 3 4 5 4 5 4 5 4 4 4 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3			
0 7 15 16	1 4 8 13 55	46 163 1 0	155 135 49 0 0
6 8 16 17	1 2 10 12 56	52 86 0 0	133 68 45 0 0
1 8 10 17 18	3 4 6 9 57	141 94 41 0 0	9 106 136 75 0
3 9 18 19	0 1 13 58	151 62 0 0	23 40 0 0
2 13 19 20	2 3 14 59	66 36 0 0	108 39 10 0
11 20 21	4 6 11 60	64 0 0	120 165 0 0
4 12 21 22	0 9 12 61	39 126 0 0	131 55 0 0
0 5 14 22 23	1 5 7 62	105 78 12 0 0	27 99 0 0
3 8 23 24	0 5 8 63	9 88 0 0	151 157 40 0
4 9 15 24 25	1 6 7 64	72 19 0 0 0	42 135 0 0
5 12 25 26	2 9 10 65	102 28 0 0	28 174 0 0
0 6 14 26 27	3 11 12 66	0 121 88 0 0	145 135 0 0
2 13 27 28	4 13 14 67	62 10 0 0	124 0 0 0
1 10 28 29	0 6 13 68	63 8 0 0	126 10 0 0
7 12 29 30	4 9 11 69	16 0 0 0	72 160 0 0
1 6 11 30 31	2 5 10 70	0 0 20 0 0	7 42 0 0
4 9 31 32	3 7 12 71	145 88 0 0	102 33 0 0
3 7 32 33	1 8 14 72	0 0 0 0	91 112 0 0
5 13 33 34	0 6 11 73	0 0 0 0	35 175 88 0
2 11 34 35	1 3 5 74	0 0 0 0	111 12 0 0
10 14 15 35	2 4 8 75	88 7 1 0	0 140 0 0
0 1 2 36	0 3 9 76	58 29 0 0	96 38 0 0
1 2 3 37	1 4 10 77	26 163 0 0	104 142 0 0
2 3 4 38	0 2 13 78	92 16 0 0	128 85 0 0
0 3 4 39	3 4 14 79	142 33 0 0	83 161 0 0
0 1 4 40	0 6 11 80	76 99 0 0	17 124 0 0
0 2 3 41	1 8 10 81	2 123 150 0	0 0 0 0
1 3 4 42	2 7 14 82	85 88 132 0	13 54 0 0
0 2 4 43	3 12 13 83	67 81 0 0	162 0 0 0
0 1 3 44	4 5 9 84	0 109 0 0	142 65 0 0
1 2 4 45	0 5 85	8 0 0 0	0 0 0
0 1 8 11 46	1 6 86	67 47 157 0 0	152 0 0
1 2 5 6 47	2 7 87	93 125 14 11 0	0 0 0
2 3 7 9 48	3 8 88	38 16 159 114 0	0 0 0
3 4 10 13 49	4 9 89	37 63 21 0 0	38 0 0
0 4 12 14 50	0 10 90	163 156 162 81 0	0 0 0
1 3 8 12 51	1 11 91	37 9 4 0 0	32 0 0
2 4 7 10 52	2 12 92	22 88 39 42 0	0 0 0
0 2 7 11 53	3 13 93	59 122 97 0 0	3 0 0
0 3 5 14 54	4 14 94	36 53 94 32 0	0 0 0

Table 99h Parity-check matrix for FL PFI 07, RL PFI 09

102 82 2			
27 27 8 9 8 9 9 8 8 8 8 8 12 13 13 12 12 13 12 13 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
4 4 4 3 4 4 5 5 4 4 4 4 5 5 4 4 4 4 5 5 5 5 5 5 5 5 4 3 4 3 4 3 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 4 4 4 5 5 4 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 4 4			
0 18 20 21	1 3 16 61	11 19 1 0	0 40 13 0
1 17 21 22	0 4 15 62	94 24 0 0	0 129 112 0
15 19 22 23	1 5 12 63	38 118 0 0	0 26 0 0
16 23 24	0 6 13 64	93 0 0	0 100 80 0
0 12 24 25	1 7 14 65	38 40 0 0	0 168 111 0
11 14 25 26	0 8 15 66	152 12 0 0	0 0 138 0
1 10 13 26 27	1 9 16 67	130 140 76 0 0	0 16 28 0
0 6 8 27 28	0 10 17 68	85 89 35 0 0	0 112 34 0
1 9 28 29	1 11 18 69	60 27 0 0	0 171 112 0
7 18 29 30	3 6 13 16 70	30 0 0 0	105 0 41 0 0
0 5 30 31	4 7 12 17 71	40 42 0 0	60 152 163 0 0
2 19 31 32	0 5 15 18 72	17 0 0 0	0 146 123 21 0
1 3 4 32 33	1 6 14 19 73	4 49 12 0 0	0 154 24 0 0
0 7 13 33 34	0 7 17 74	139 2 36 0 0	0 131 131 0
1 14 34 35	1 8 16 75	0 118 0 0	0 7 22 0
6 16 35 36	9 12 19 76	35 0 0 0	12 24 0 0
0 10 36 37	2 10 13 18 77	54 36 0 0	106 120 17 8 0
4 17 37 38	5 11 14 19 78	104 11 0 0	155 83 144 15 0
1 8 12 38 39	2 15 18 79	42 32 43 0 0	122 0 20 0
3 9 20 39 40	0 3 10 19 80	128 29 0 0 0	0 78 75 156 0
1 13 15 40 41	1 4 11 18 81	99 0 0 0 0	0 143 8 134 0
0 5 14 41 42	8 12 14 17 82	134 81 0 0 0	16 147 22 0 0
1 6 16 42 43	9 13 15 16 83	38 0 3 0 0	56 113 42 0 0
0 4 17 43 44	0 3 18 84	88 38 0 0 0	0 154 59 0
1 11 19 44 45	0 9 16 85	73 3 96 0 0	0 15 20 0
0 2 12 45 46	1 10 17 86	107 106 121 0 0	0 12 136 0
1 15 46 47	0 11 18 87	2 32 0 0	0 16 49 0
8 47 48	1 12 19 88	88 0 0	0 66 28 0
0 10 48 49	0 6 13 89	34 0 0 0	0 125 12 0
5 49 50	1 7 14 90	0 0 0	0 162 65 0
1 18 50 51	0 12 15 91	8 0 0 0	0 22 47 0
9 51 52	1 8 16 92	0 0 0	0 137 98 0
0 2 7 52 53	2 9 17 93	171 0 63 0 0	160 39 99 0
1 3 11 20 53	3 10 13 18 94	0 0 132 1 0	0 51 154 0 0
0 12 15 54	4 11 14 19 95	0 19 103 0	36 125 126 0 0
1 13 16 55	3 5 12 15 96	0 172 34 0	41 168 25 0 0
0 14 17 56	2 6 13 16 97	0 21 137 0	121 24 0 0 0
1 12 18 57	5 7 14 17 98	0 84 154 0	39 14 85 0 0
0 13 19 58	4 8 15 19 99	0 121 98 0	78 66 0 148 0
1 14 17 59	5 13 17 100	0 169 0 0	50 61 0 0
0 2 19 60	6 14 19 101	0 70 0 0	85 67 0 0

Table 99i Parity-check matrix for FL PFI 08, RL PFI 10

142 117 2			
15 14 13 13 13 13 13 14 14 14 13 13 13 12 12 12 13 13 13 13 12 12 11 12 11 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
4 4 4 4 5 5 5 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4			
0 5 25 26	7 10 16 84	0 0 1 0	9 136 0 0
2 8 26 27	8 11 17 85	0 0 0 0	157 51 0 0
3 9 27 28	9 18 86	0 0 0 0	75 0 0
6 11 28 29	10 19 87	0 0 0 0	0 0 0
4 7 10 29 30	11 20 88	0 0 0 0 0	114 0 0
1 14 18 30 31	2 21 89	0 0 0 0 0	152 0 0
12 16 20 31 32	12 16 90	0 0 0 0 0	21 0 0
13 17 21 32 33	13 17 91	0 0 0 0 0	162 0 0
15 19 33 34	14 18 92	0 0 0 0	16 0 0
0 3 12 34 35	15 19 93	137 121 120 0 0	40 0 0
4 14 23 35 36	4 12 94	29 57 0 0 0	73 0 0
1 5 22 36 37	5 13 95	14 105 0 0 0	121 0 0
2 13 24 37 38	2 22 96	4 159 0 0 0	159 0 0
0 6 17 38 39	3 23 97	130 157 75 0 0	62 0 0
8 15 18 39 40	8 16 98	38 59 133 0 0	45 0 0
1 7 16 40 41	9 17 99	165 168 123 0 0	109 0 0
9 22 25 41 42	6 18 100	171 156 0 0 0	17 0 0
0 10 19 42 43	7 19 101	163 70 5 0 0	8 0 0
2 12 21 43 44	11 20 102	68 160 107 0 0	0 28 0
1 11 23 44 45	10 21 103	120 134 56 0 0	152 0 0
3 13 20 45 46	12 14 19 104	115 57 129 0 0	48 85 17 0
0 7 15 46 47	13 15 20 105	145 22 70 0 0	59 121 32 0
5 17 24 47 48	14 16 21 106	48 95 159 0 0	55 146 112 0
1 4 16 48 49	12 15 17 107	94 76 165 0 0	159 110 73 0
6 14 22 49 50	2 16 18 108	126 36 90 0 0	8 0 12 0
0 9 18 50 51	3 17 20 109	77 49 151 0 0	103 29 0 0
11 21 24 51 52	4 18 21 110	173 100 85 0 0	136 73 0 0
1 8 19 52 53	5 19 22 111	40 111 119 0 0	146 56 0 0
10 20 23 25 53	6 20 23 112	103 123 127 1 0	50 139 0 0
0 3 12 54	7 21 24 113	4 110 0 0	59 86 0 0
1 2 13 55	7 12 22 114	43 31 0 0	51 0 153 0
0 4 14 56	8 13 23 115	59 21 0 0	123 0 88 0
1 5 15 57	9 14 24 116	102 0 0 0	104 0 66 0
0 4 6 58	10 15 24 117	138 6 0 0	20 53 21 0
1 5 7 59	11 16 23 118	56 40 0 0	174 9 121 0
0 6 8 60	2 17 119	90 2 0 0	147 0 0
1 7 9 61	3 18 120	76 19 0 0	145 0 0
0 8 10 62	4 19 121	118 77 0 0	105 13 0
1 9 11 63	5 20 122	64 17 0 0	11 0 0
0 2 10 64	6 21 123	152 39 0 0	69 0 0
1 3 11 65	12 17 22 124	23 22 0 0	10 130 36 0
2 6 16 66	13 18 23 125	5 18 0 0	134 95 139 0
3 7 17 67	14 19 24 126	24 37 0 0	117 18 101 0
4 8 18 68	8 10 15 127	10 124 0 0	8 35 20 0
5 9 19 69	9 11 16 128	157 133 0 0	37 154 100 0
6 10 20 70	12 17 22 129	42 153 0 0	76 71 0 0
7 11 21 71	13 18 23 130	47 0 0 0	62 162 172 0
2 8 22 72	14 19 24 131	22 0 0 0	47 174 153 0
3 9 23 73	7 15 20 132	39 129 0 0	144 154 149 0
4 10 24 74	8 16 21 133	34 0 0 0	27 145 0 0
5 11 75	2 9 17 134	30 0 0	151 117 0 0
0 2 6 76	3 10 18 135	1 121 162 0	56 104 0 0
3 7 22 77	4 11 19 136	96 142 0 0	28 19 148 0
4 8 23 78	5 12 20 137	35 45 0 0	68 103 0 0
5 9 24 79	6 13 21 138	108 115 0 0	38 58 16 0
0 3 12 80	7 14 22 139	171 138 0 0	129 118 0 0
1 4 13 81	8 15 23 140	110 42 0 0	98 51 13 0
0 5 14 82	9 16 24 141	55 115 0 0	173 101 94 0
1 6 15 83		5 85 28 0	

Table 99j Parity-check matrix for FL PFI 09, RL PFI 11

60 48 4	
22 21 21 22 6 7 7 7 6 7 6 6 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
4 4 4 4 5 4 5 4 5 4 5 4 4 4 4 5 4 4 4 4 4 4 4 4 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	
0 5 12 13	98 142 1 0
4 6 13 14	205 338 0 0
1 8 14 15	25 46 0 0
7 9 15 16	333 91 0 0
0 4 11 16 17	83 105 306 0 0
2 10 17 18	275 78 0 0
2 5 7 18 19	318 366 75 0 0
3 6 19 20	369 55 0 0
0 9 12 20 21	0 3 0 0 0
8 10 21 22	105 43 0 0
1 5 11 22 23	0 110 37 0 0
3 4 23 24	79 299 0 0
2 8 24 25	0 34 0 0
6 9 25 26	104 0 0 0
3 10 26 27	16 0 0 0
1 7 11 12 27	186 0 0 1 0
0 1 2 28	399 235 0 0
0 1 3 29	346 120 0 0
0 2 3 30	166 79 0 0
1 2 3 31	80 69 56 0
0 1 2 32	145 101 67 0
0 1 3 33	143 294 0 0
0 2 3 34	0 336 0 0
1 2 3 35	262 0 0 0
0 1 2 4 36	322 232 45 384 0
0 1 3 5 37	139 387 388 0 0
0 2 3 6 38	369 315 310 277 0
1 2 3 7 39	6 125 154 328 0
0 1 2 8 40	108 49 0 434 0
0 1 3 9 41	232 373 220 97 0
0 2 9 42	410 229 0 0
1 3 10 43	313 0 0 0
0 3 11 44	119 417 0 0
1 2 3 45	221 347 0 0
2 8 10 46	314 0 0 0
3 7 11 47	0 78 0 0
1 2 4 48	31 0 0 0
0 1 5 49	256 226 0 0
0 3 6 50	177 361 0 0
2 3 9 51	370 396 0 0
0 6 7 52	218 0 0 0
1 4 5 53	343 0 0 0
2 10 11 54	68 114 0 0
0 3 9 55	218 340 0 0
0 2 8 56	288 292 0 0
1 3 7 57	31 391 0 0
0 1 6 58	48 0 0 0
2 3 5 59	186 336 0 0

Table 99k Parity-check matrix for FL PFI 10, RL PFI 12

61 47 5	
14 14 14 14 14 9 9 9 9 9 9 8 9 11 3 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
6 6 5 4 6 7 6 6 5 4 4 5 4 4 4 4 4 4 4 5 5 4 4 4 4 4 5 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5	
0 5 8 11 14 15	151 99 405 8 1 0
1 6 9 12 15 16	66 217 205 67 0 0
2 7 10 16 17	131 112 55 0 0
4 13 17 18	188 68 0 0
1 3 5 9 18 19	69 237 18 198 0 0
4 6 10 11 14 19 20	47 72 9 97 0 0 0
3 7 8 12 20 21	64 67 93 0 0 0
2 4 5 10 21 22	405 55 0 295 0 0
0 6 13 22 23	120 0 73 0 0
3 8 23 24	313 0 0 0
1 11 24 25	220 0 0 0
4 7 9 25 26	136 0 0 0 0
0 12 26 27	0 64 0 0
2 13 14 27	143 0 1 0
0 1 4 28	63 307 264 0
0 2 3 29	319 74 65 0
0 3 4 30	220 96 121 0
1 2 3 31	82 360 177 0
1 2 4 32	0 90 61 0
0 1 6 13 33	114 162 351 0 0
3 4 7 10 34	76 271 425 271 0
0 2 11 35	152 0 318 0
1 4 13 36	331 176 0 0
1 6 8 37	223 284 231 0
0 9 13 38	396 89 208 0
3 10 12 39	282 375 437 0
2 5 12 13 40	96 311 0 352 0
0 5 8 41	196 422 0 0
1 6 9 42	310 128 0 0
2 4 11 43	255 384 184 0
3 7 13 44	250 161 178 0
2 4 8 45	149 276 288 0
1 3 5 46	186 71 322 0
0 2 9 47	0 351 367 0
1 3 12 48	295 325 0 0
2 6 13 49	0 148 206 0
1 7 11 50	227 293 101 0
0 4 12 51	343 352 0 0
3 5 10 52	420 0 260 0
1 7 12 53	113 11 0 0
2 5 9 13 54	76 362 348 0 0
0 6 8 10 55	421 162 331 200 0
4 8 9 11 56	428 299 0 111 0
4 7 9 13 57	190 123 321 359 0
3 6 10 12 58	197 0 95 199 0
0 3 7 11 59	81 356 0 301 0
2 5 8 10 60	343 352 289 18 0

Table 99l Parity-check matrix for FL PFI 11, RL PFI 13

62 46 2	
18 18 6 7 7 7 7 7 7 6 8 7 8 8 7 7 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
4 3 4 4 4 3 4 3 4 3 4 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 5 4 5 5 5 5 5 5 5 5 5 5 4 4 4	
0 15 16 17	100 257 1 0
12 17 18	246 0 0
1 13 18 19	426 229 0 0
11 14 19 20	310 70 0 0
0 9 20 21	420 45 0 0
7 21 22	23 0 0
1 10 22 23	70 38 0 0
8 23 24	319 0 0
0 4 24 25	162 92 0 0
2 25 26	10 0 0
1 5 26 27	149 53 0 0
3 27 28	30 0 0
0 10 11 28 29	334 97 0 0 0
1 6 14 29 30	57 220 95 0 0
0 2 15 30 31	89 115 86 0 0
1 5 8 31 32	24 74 291 0 0
9 12 16 32 33	87 114 0 0 0
1 4 7 33 34	292 231 91 0 0
0 5 10 34 35	53 0 0 0 0
3 6 13 35 36	28 55 331 0 0
0 9 14 36 37	58 0 0 0 0
1 2 12 37 38	13 0 0 0 0
0 7 11 38 39	351 220 335 0 0
1 6 15 39 40	51 251 0 0 0
0 4 13 40 41	0 0 0 0 0
1 3 8 16 41	0 0 0 1 0
0 1 10 11 42	371 0 59 0 0
0 3 10 14 43	78 342 54 0 0
1 4 11 15 44	346 66 64 0 0
0 5 12 13 45	238 164 106 33 0
1 6 13 46	373 0 0 0
0 7 12 14 47	165 0 59 0 0
1 8 13 48	400 40 0 0
0 9 11 15 49	419 49 250 0 0
1 2 10 12 50	0 102 311 0 0
0 2 8 15 51	171 315 132 0 0
1 4 9 14 52	326 343 46 25 0
0 5 6 14 53	298 288 36 4 0
1 4 8 15 54	62 6 144 392 0
0 3 7 13 55	319 212 91 0 0
1 5 6 12 56	0 118 0 305 0
0 2 7 11 57	68 370 282 392 0
1 3 9 10 58	93 192 85 102 0
4 6 12 59	422 84 0 0
5 7 13 60	168 0 0 0
3 8 10 61	70 0 0 0

Table 99m Parity-check matrix for FL PFI 12, RL PFI 14

62 44 2	
21 21 7 6 7 7 7 7 7 6 5 5 7 5 7 5 7 7 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
6 6 6 6 6 6 6 6 6 5 6 5 6 5 6 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	
0 2 4 6 18 19	436 283 226 26 1 0
1 3 5 7 19 20	137 69 365 27 0 0
0 8 10 12 20 21	167 248 44 39 0 0
1 9 11 13 21 22	106 348 5 46 0 0
0 8 14 16 22 23	151 2 43 3 0 0
1 2 15 17 23 24	220 222 7 165 0 0
0 3 14 18 24 25	256 241 28 0 0 0
4 9 10 16 25 26	134 8 66 38 0 0
1 6 11 12 26 27	260 231 30 43 0 0
5 7 15 27 28	70 372 36 0 0
0 3 8 17 28 29	23 0 0 54 0 0
2 6 13 29 30	149 110 46 0 0
1 5 9 14 30 31	125 0 0 0 0 0
4 7 11 31 32	55 30 0 0 0
0 12 13 15 32 33	0 127 0 52 0 0
1 10 16 17 18 33	13 0 0 0 1 0
0 1 7 34	362 432 0 0
0 1 4 35	188 45 0 0
0 1 9 36	64 2 0 0
1 2 6 37	438 13 0 0
0 3 7 38	347 30 0 0
0 1 8 39	66 58 0 0
0 1 5 40	323 153 0 0
0 1 2 41	240 138 0 0
1 6 17 42	438 53 0 0
0 5 16 43	122 287 0 0
0 8 12 44	162 252 0 0
1 4 14 45	9 151 0 0
0 2 10 46	17 115 0 0
1 3 11 47	302 371 0 0
0 7 13 48	355 396 0 0
1 9 15 49	138 355 0 0
0 4 12 50	312 177 0 0
1 5 14 51	0 311 0 0
0 6 16 52	396 393 0 0
1 8 17 53	210 244 0 0
0 10 14 54	240 171 98 0
1 11 15 55	336 259 433 0
6 12 16 56	194 0 0 0
8 13 17 57	127 344 0 0
0 3 12 58	386 196 330 0
2 7 14 59	321 48 220 0
1 5 16 60	209 413 0 0
4 9 17 61	203 150 6 0

Table 99n Parity-check matrix for FL PFI 13

66 46 2	
12 12 5 5 4 4 5 4 4 5 9 8 8 8 8 8 9 9 9 9 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
7 8 5 5 5 4 8 7 7 7 5 4 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	
1 3 5 7 9 20 21	18 126 192 281 20 1 0
0 2 4 6 8 18 21 22	101 183 54 207 33 34 0 0
1 13 17 22 23	125 90 6 0 0
11 15 19 23 24	48 53 57 0 0
0 12 16 24 25	135 95 45 0 0
10 14 25 26	21 51 0 0
1 2 5 11 12 20 26 27	267 275 36 37 28 0 0 0
3 4 10 13 18 27 28	122 313 118 21 11 0 0
0 7 8 15 16 28 29	50 9 320 33 53 0 0
6 9 14 17 19 29 30	39 246 25 4 23 0 0
1 7 11 30 31	139 110 220 0 0
3 15 31 32	274 0 0 0
0 6 10 32 33	73 377 220 0 0
2 14 18 33 34	0 64 220 0 0
1 8 13 34 35	0 0 110 0 0
5 16 19 35 36	110 220 0 0 0
0 9 12 36 37	181 0 0 0 0
4 17 20 37	88 0 1 0
0 1 10 38	30 383 0 0
0 11 16 39	434 318 0 0
1 12 17 40	387 161 418 0
0 13 14 41	47 268 0 0
1 10 15 42	288 266 0 0
0 12 15 43	161 6 0 0
1 13 16 44	10 79 0 0
0 10 17 45	175 174 3 0
1 11 14 46	274 136 0 0
10 13 47	275 0 0
11 14 48	0 0 0
12 15 49	0 0 0
2 16 18 50	414 269 0 0
3 17 19 51	26 106 0 0
9 16 18 52	374 277 0 0
6 17 19 53	175 47 0 0
10 16 19 54	214 429 236 0
11 17 18 55	22 186 0 0
12 14 19 56	260 203 0 0
13 15 18 57	392 194 64 0
0 2 9 58	0 120 0 0
1 3 6 59	0 294 0 0
0 4 7 60	0 105 0 0
1 5 8 61	11 423 0 0
10 16 18 62	27 266 196 0
11 17 19 63	3 330 113 0
12 14 18 64	34 217 0 0
13 15 19 65	45 239 0 0

Table 99o Parity-check matrix for FL PFI 14

162 107 2			
33 33 8 8 8 8 8 8 8 8 8 8 8 8 9 9 9 9 9 9 9 9 9 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
5 4 5 4 5 4 5 4 5 4 5 4 7 6 6 6 6 6 6 6 6 6 7 6 6 6 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4			
0 10 20 55 56	0 4 10 18 109	0 0 0 1 0	60 124 74 0 0
5 15 56 57	1 5 11 19 110	0 0 0 0	158 57 146 0 0
1 11 21 57 58	0 6 12 20 111	0 0 0 0 0	149 27 0 66 0
6 16 58 59	1 7 13 21 112	0 0 0 0	146 33 19 0 0
2 12 22 59 60	0 8 10 14 113	0 0 0 0 0	147 10 71 0 0
7 17 60 61	1 9 11 15 114	0 0 0 0	73 34 16 62 0
3 13 23 61 62	0 3 9 17 115	0 0 0 0 0	62 75 82 0 0
8 18 62 63	1 2 10 18 116	0 0 0 0	18 33 34 0 0
4 14 24 63 64	0 5 11 19 117	0 0 0 0 0	103 73 0 25 0
9 19 64 65	1 4 12 20 118	0 0 0 0	149 43 31 0 0
0 29 35 41 47 65 66	0 7 13 21 119	93 0 0 0 0 0 0	8 24 0 175 0
26 32 38 44 66 67	1 6 14 120	0 0 0 0 0 0	19 3 0 0
1 30 36 42 67 68	8 15 16 121	38 0 0 0 0 0	0 171 2 0
27 33 39 45 68 69	3 13 42 49 122	0 0 0 0 0 0	118 9 88 69 0
25 31 37 43 69 70	4 14 43 50 123	0 0 0 0 0 0	66 139 1 146 0
28 34 40 46 70 71	5 15 44 51 124	0 0 0 0 0 0	80 138 0 172 0
7 9 29 49 71 72	6 16 45 52 125	64 95 19 0 0 0	144 66 103 0 0
0 26 48 51 72 73	7 17 46 53 126	21 73 0 0 0 0	170 108 0 122 0
6 25 31 50 73 74	8 18 47 54 127	47 102 125 0 0 0	144 67 30 55 0
3 5 27 53 74 75	0 9 19 48 128	11 124 27 0 0 0	130 55 0 11 0
2 4 28 30 52 75 76	1 10 20 49 129	33 159 61 78 0 0 0	20 83 138 53 0
1 8 32 54 76 77	0 11 21 50 130	15 126 18 0 0 0	83 39 99 115 0
12 35 40 49 77 78	1 12 22 51 131	174 110 24 107 0 0	14 171 118 126 0
11 13 14 41 78 79	0 13 23 52 132	105 31 89 84 0 0	72 136 100 0 0
0 33 37 50 55 79 80	1 14 24 53 133	35 147 70 17 0 0 0	133 128 23 0 0
10 34 39 48 80 81	0 15 25 54 134	41 21 92 123 0 0	143 146 46 0 0
1 16 18 51 81 82	1 16 26 42 135	127 10 12 165 0 0	153 91 100 0 0
15 17 36 38 82 83	0 17 27 43 136	74 151 94 11 0 0	131 46 18 17 0
10 23 25 45 83 84	1 18 28 44 137	141 126 167 171 0 0	175 152 109 120 0
2 24 42 52 84 85	0 19 29 45 138	37 62 3 173 0 0	169 0 63 175 0
1 19 22 47 85 86	1 20 30 46 139	146 166 96 54 0 0	64 92 58 0 0
21 34 44 53 86 87	0 21 31 47 140	143 151 86 170 0 0	170 0 127 0 0
20 26 33 46 87 88	1 2 32 48 141	91 87 0 81 0 0	164 84 8 0 0
3 11 43 54 88 89	0 2 22 142	67 139 61 57 0 0	166 147 0 0
5 13 15 42 89 90	1 3 23 143	76 133 110 156 0 0	26 33 0 0
12 29 36 48 90 91	0 4 24 144	85 41 45 155 0 0	22 25 0 0
4 28 49 52 91 92	1 5 25 145	65 122 35 81 0 0	169 107 0 0
6 19 21 43 92 93	0 6 26 146	60 113 119 164 0 0	169 0 65 0
27 37 44 53 93 94	1 7 27 147	9 2 4 6 0 0	156 76 0 0
0 14 20 35 94 95	0 8 28 148	152 10 36 117 0 0	132 46 0 0
7 22 23 46 95 96	1 9 29 149	156 61 72 11 0 0	28 93 0 0
17 30 39 51 96 97	0 10 30 150	174 39 131 156 0 0	108 0 0 0
9 16 24 38 97 98	1 11 31 151	146 162 94 3 0 0	134 0 61 0
0 8 40 54 98 99	0 12 32 152	59 57 162 86 0 0	23 0 0 0
1 31 32 47 99 100	1 13 33 153	117 169 77 103 0 0	115 40 0 0
18 41 45 50 55 100	0 14 34 154	93 80 158 71 1 0	139 0 0 0
0 2 16 101	1 15 35 155	48 156 0 0	84 60 0 0
1 3 17 102	0 16 36 156	126 15 0 0	168 0 0 0
0 4 12 18 103	1 17 37 157	26 68 10 0 0	103 40 0 0
1 5 13 19 104	0 18 38 158	7 12 168 33 0	100 92 42 0
0 6 14 20 105	1 19 39 159	94 34 0 37 0	1 0 23 0
1 7 15 21 106	0 20 40 160	142 12 17 0 0	46 0 0 0
0 2 8 16 107	1 21 41 161	137 97 106 0 0	131 154 0 0
1 3 9 17 108		98 76 35 0 0	

Table 99p Parity-check matrix for RL PFI 00

99 88 11			
16 16 16 16 16 16 16 16 16 16 16 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 3 3 3 3 3 3 4 4 4 4 4 3 3 3 3 4 4 4 4 4 4 4 3 3 3 3 4 4 4 4 4 4 4 3 3 3 3 4 4 4 4 4 4 4			
0 11 12	0 9 55	8 1 0	19 0 0
1 12 13	0 10 56	9 0 0	1 0 0
2 13 14	0 1 57	0 0 0	0 0 0
3 14 15	0 2 58	2 0 0	0 0 0
4 15 16	1 2 59	1 0 0	16 0 0
5 16 17	1 6 60	14 0 0	11 0 0
6 17 18	1 4 7 61	12 0 0	4 12 16 0
7 18 19	1 5 8 62	8 0 0	13 2 0 0
8 19 20	1 6 9 63	1 0 0	10 5 13 0
9 20 21	1 7 10 64	14 0 0	2 3 0 0
10 21 22	1 2 8 65	0 0 0	4 9 0 0
0 22 23	3 9 66	4 0 0	7 0 0
1 23 24	4 10 67	11 0 0	13 0 0
2 24 25	1 2 68	0 0 0	0 3 0
3 25 26	1 7 69	3 0 0	3 3 0
4 11 26 27	1 4 8 70	4 0 0 0	0 4 9 0
5 27 28	2 5 9 71	11 0 0	6 13 0 0
6 28 29	2 6 10 72	2 0 0	3 0 0 0
7 29 30	2 3 8 73	4 0 0	12 3 0 0
8 30 31	2 4 9 74	3 0 0	7 14 0 0
9 31 32	2 5 10 75	12 0 0	2 1 0 0
10 32 33	2 3 6 76	10 0 0	0 3 0 0
0 33 34	4 7 77	1 0 0	3 6 0
1 34 35	5 8 78	0 0 0	14 0 0
2 35 36	2 9 79	0 0 0	10 0 0
3 36 37	3 7 80	10 0 0	4 9 0
4 37 38	3 4 9 81	0 0 0	4 10 0 0
5 38 39	3 5 10 82	5 0 0	14 4 5 0
6 39 40	3 4 6 83	7 0 0	1 0 0 0
7 40 41	3 5 7 84	0 0 0	2 1 0 0
8 41 42	3 6 8 85	0 0 0	0 0 3 0
9 42 43	3 7 9 86	0 0 0	0 4 0 0
10 11 43	4 8 10 87	0 1 0	11 2 0 0
1 2 44	5 6 88	14 0 0	4 0 0
3 4 45	6 7 89	12 0 0	10 0 0
0 6 46	4 7 90	16 0 0	0 0 0
0 8 47	4 8 91	7 0 0	0 0 0
0 9 10 48	5 9 10 92	14 1 0 0	12 4 0 0
0 1 3 49	5 6 8 93	7 9 0 0	11 5 0 0
0 2 4 50	5 7 9 94	6 5 0 0	10 0 0 0
0 3 5 51	5 8 10 95	14 3 10 0	0 5 17 0
0 4 6 52	6 7 10 96	18 1 0 0	4 6 0 0
0 5 7 53	7 9 10 97	10 3 0 0	1 0 2 0
0 6 8 54	8 9 10 98	0 1 0 0	0 0 0 0

Table 99q Parity-check matrix for RL PFI 04

102 82 2			
23 24 10 10 10 10 10 9 10 10 10 10 10 10 10 10 10 10 10 10 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
4 4 4 3 4 3 4 4 5 4 4 4 4 5 5 4 4 4 4 5 5 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 5 5 4 5 5 5 4 4 4 4 4 4 5 5 5 5 5 5 5 5 4			
0 18 20 21	1 2 11 20 61	68 10 1 0	0 44 0 1 0
1 17 21 22	0 2 12 16 62	19 17 0 0	40 49 64 16 0
15 19 22 23	1 3 13 17 63	18 0 0 0	67 2 0 0 0
16 23 24	0 4 14 18 64	15 0 0	0 58 11 47 0
0 11 24 25	1 5 15 19 65	59 5 0 0	64 26 5 0 0
10 25 26	0 2 6 16 66	14 0 0	0 4 87 55 0
1 13 26 27	1 3 7 17 67	38 22 0 0	59 30 0 0 0
12 14 27 28	0 4 8 18 68	12 40 0 0	0 77 35 31 0
0 6 8 28 29	1 5 9 19 69	11 24 19 0 0	29 10 0 8 0
1 9 29 30	0 3 6 10 70	24 51 0 0	0 69 9 19 0
7 18 30 31	1 4 7 11 71	35 0 0 0	82 0 6 34 0
0 5 31 32	0 5 8 12 72	34 82 0 0	0 82 87 66 0
2 19 32 33	1 6 9 13 73	77 42 0 0	0 13 0 0 0
1 3 4 33 34	7 8 10 14 74	22 40 2 0 0	37 0 0 44 0
0 7 13 34 35	2 9 11 15 75	50 64 9 0 0	69 0 58 0 0
1 14 35 36	0 2 7 17 76	18 6 0 0	0 49 73 33 0
6 16 36 37	1 4 8 16 77	51 16 0 0	0 8 6 28 0
0 10 37 38	0 9 12 78	48 7 0 0	0 41 74 0
4 17 38 39	6 10 13 79	55 20 0 0	26 9 2 0
1 8 12 39 40	5 11 14 80	19 18 20 0 0	63 24 0 0
3 9 20 40 41	1 2 15 18 81	74 21 0 0 0	0 86 14 60 0
1 15 41 42	0 3 10 19 82	42 8 0 0	0 54 17 61 0
13 42 43	1 4 18 83	39 0 0	0 87 0 0
0 14 43 44	8 12 14 17 84	20 0 0 0	84 69 15 35 0
5 44 45	5 9 13 15 85	65 0 0	78 48 60 0 0
1 16 45 46	0 3 6 16 86	17 0 0 0	0 11 19 0 0
6 46 47	1 11 19 87	0 0 0	0 38 15 0
0 17 47 48	0 8 16 88	60 0 0 0	0 3 37 0
4 48 49	1 9 17 89	41 0 0	0 23 37 0
1 19 49 50	0 10 18 90	10 0 0 0	0 5 72 0
11 50 51	1 11 19 91	3 0 0	0 26 0 0
0 12 51 52	12 16 18 92	19 30 0 0	9 39 83 0
2 52 53	10 13 17 19 93	3 0 0	38 7 26 0 0
1 15 53 54	2 5 11 14 94	6 0 0 0	41 12 15 0 0
8 54 55	3 6 12 15 95	44 0 0	8 44 0 24 0
0 9 55 56	4 9 13 16 96	0 5 0 0	69 13 43 65 0
5 56 57	5 10 14 17 97	0 0 0	33 85 64 0 0
1 18 57 58	2 6 15 18 98	74 0 0 0	7 28 62 0 0
10 58 59	3 7 12 19 99	71 0 0	79 25 31 0 0
0 7 59 60	4 8 13 15 100	67 0 0 0	18 50 78 43 0
3 60 61	7 11 14 101	27 0 0	33 56 0 0

Table 99r Parity-check matrix for RL PFI 05

86 70 2			
16 16 9 9 8 8 8 8 8 8 8 8 8 8 18 18 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
4 4 3 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4			
1 14 16 17	6 51 52	65 2 1 0	0 0 0
11 15 17 18	0 14 52 53	6 8 0 0	45 7 0 0
12 18 19	8 53 54	18 0 0	0 0 0
13 19 20	12 54 55	89 0 0	0 0 0
0 9 20 21	3 16 55	141 7 0 0	0 1 0
7 21 22	0 2 5 14 56	8 0 0	0 16 2 119 0
6 10 22 23	1 3 6 14 57	72 16 0 0	0 134 121 57 0
8 23 24	0 4 7 14 58	105 0 0	0 120 15 40 0
1 5 24 25	1 5 8 14 59	63 91 0 0	0 133 20 1 0
3 25 26	0 6 9 14 60	90 0 0	0 71 43 0 0
2 4 26 27	1 7 10 14 61	97 101 0 0	0 0 10 43 0
15 27 28	0 8 11 15 62	0 0 0	0 98 7 1 0
0 12 28 29	1 9 12 15 63	101 22 0 0	0 147 57 32 0
5 29 30	0 10 13 15 64	13 0 0	0 90 121 12 0
1 10 30 31	1 2 11 15 65	94 140 0 0	0 75 141 14 0
7 31 32	0 3 12 15 66	85 0 0	0 86 91 0 0
0 6 32 33	1 4 13 15 67	8 24 0 0	0 35 145 58 0
2 33 34	2 12 14 68	47 0 0	124 18 0 0
1 14 34 35	3 13 15 69	0 0 0 0	51 142 0 0
9 35 36	4 11 15 70	12 0 0	138 0 0 0
0 11 36 37	5 8 11 14 71	54 16 0 0	48 73 29 0 0
8 37 38	6 10 12 14 72	59 0 0	30 144 68 0 0
1 16 38 39	7 9 13 15 73	42 0 0 0	56 26 51 0 0
4 39 40	2 6 8 15 74	116 0 0	100 86 23 0 0
0 13 40 41	3 5 10 14 75	6 10 0 0	16 32 129 0 0
3 41 42	4 7 9 14 76	23 0 0	13 65 0 0 0
1 9 42 43	1 2 15 77	79 0 0 0	145 141 100 0
7 43 44	0 3 14 78	45 0 0	0 142 66 0
0 11 44 45	1 4 14 79	81 0 0 0	0 45 12 0
2 45 46	0 5 15 80	114 0 0	0 129 4 0
1 15 46 47	2 6 15 81	13 114 0 0	141 36 0 0
5 47 48	3 7 14 82	76 0 0	81 26 0 0
0 10 48 49	8 12 14 83	76 0 0 0	43 12 105 0
4 49 50	9 13 15 84	2 0 0	140 27 143 0
1 13 50 51	10 11 15 85	29 19 0 0	145 10 100 0

Table 99s Parity-check matrix for RL PFI 06

110 90 10			
14 15 14 14 14 14 15 15 15 15 8 8 9 9 9 8 8 9 9 9 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
5 5 5 5 5 5 5 4 3 4 4 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4			
0 1 10 20 21	2 10 19 65	28 30 126 1 0	70 88 0 0
2 18 19 21 22	3 11 12 66	148 41 29 0 0	139 22 0 0
3 16 17 22 23	4 13 14 67	35 2 30 0 0	1 5 0 0
4 14 15 23 24	0 6 12 68	11 37 3 0 0	52 13 0 0
5 12 13 24 25	1 7 13 69	34 58 34 0 0	0 26 0 0
6 10 11 25 26	2 8 14 70	156 165 45 0 0	41 0 0 0
7 17 19 26 27	3 9 15 71	7 43 0 0 0	113 34 0 0
8 18 27 28	5 9 16 72	135 37 0 0	28 0 0 0
15 28 29	0 4 17 73	101 0 0	27 15 0 0
9 16 29 30	1 5 18 74	0 127 0 0	43 26 0 0
13 20 30 31	2 4 19 75	80 0 0 0	112 54 0 0
0 14 31 32	3 7 10 76	140 23 0 0	135 134 0 0
10 32 33	6 8 11 77	0 0 0	168 0 150 0
2 11 33 34	4 10 18 78	18 14 0 0	58 118 0 0
3 34 35	0 5 11 79	66 0 0	127 9 0 0
4 12 35 36	1 6 12 80	20 105 0 0	63 139 0 0
5 36 37	2 7 13 81	33 0 0	168 156 0 0
6 13 37 38	3 8 14 82	126 86 0 0	166 2 0 0
7 38 39	4 9 15 83	36 0 0	147 26 0 0
8 14 39 40	0 7 16 84	21 0 0 0	89 0 0 0
9 40 41	1 8 17 85	0 0 0	171 78 0 0
2 15 41 42	2 9 18 86	0 0 0 0	103 0 0 0
0 42 43	3 5 19 87	111 0 0	5 54 0 0
4 16 43 44	5 6 10 88	0 0 0 0	139 115 0 0
1 44 45	0 2 15 89	97 0 0	0 9 0 0
3 17 45 46	1 3 16 90	44 0 0 0	32 0 0 0
6 46 47	4 6 19 91	36 0 0	0 0 0 0
5 18 47 48	5 7 17 92	72 0 0 0	30 0 0 0
8 48 49	6 8 11 93	0 0 0	66 0 0 0
9 19 49 50	7 9 12 94	3 0 0 0	171 39 0 0
7 50 51	0 8 13 95	0 0 0	0 0 0 0
11 51 52	1 9 14 96	0 0 0	35 68 0 0
1 12 20 52	6 12 17 97	0 0 1 0	0 0 0 0
5 6 9 53	7 13 18 98	0 0 80 0	21 0 0 0
3 4 9 54	8 14 19 99	120 0 46 0	38 0 0 0
1 2 9 55	0 4 14 100	151 14 0 0	124 20 0 0
0 7 8 56	1 5 15 101	43 34 0 0	72 0 0 0
4 6 8 57	2 6 16 102	156 38 0 0	36 148 0 0
1 3 8 58	3 7 17 103	145 30 0 0	0 3 0 0
2 5 7 59	4 8 18 104	43 53 0 0	0 72 0 0
0 4 7 60	5 9 19 105	162 132 0 0	39 0 0 0
1 2 6 61	0 6 10 106	76 0 0 0	35 0 0 0
0 3 5 62	1 7 11 107	73 0 0 0	64 1 0 0
9 15 16 63	2 8 12 108	51 18 0 0	86 0 0 0
1 17 18 64	3 9 13 109	0 0 0 0	21 67 0 0

Table 99t Parity-check matrix for RL PFI 07

<table>
<tr><td colspan="4">108 78 3</td></tr>
<tr><td colspan="4">12 12 13 10 10 9 9 8 9 9 9 8 9 9 8 9 7 6 5 5 7 6 7 6 6 6 6 6 6 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1</td></tr>
<tr><td colspan="4">6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 4 4 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4</td></tr>
<tr><td>0 18 19 22 30 31
2 17 20 21 31 32
1 24 25 27 32 33
2 23 26 28 33 34
0 3 17 18 34 35
1 4 23 29 35 36
2 5 19 24 36 37
0 6 25 29 37 38
1 7 12 20 38 39
2 13 21 26 39 40
0 10 16 27 40 41
9 11 17 19 41 42
1 3 18 24 42 43
8 15 22 30 43 44
2 7 14 25 44 45
5 12 23 29 45 46
1 6 11 26 46 47
4 13 20 28 47 48
3 21 48 49
0 14 49 50
2 9 50 51
8 27 51 52
15 28 52 53
1 16 53 54
2 4 10 22 54 55
0 7 55 56
5 9 56 57
1 8 57 58
6 10 58 59
0 13 59 60
11 15 60 61
2 12 61 62
14 16 30 62
0 4 12 63
1 3 13 64
2 5 15 65
0 6 14 66
1 7 16 67
2 8 11 68</td><td>0 9 10 69
1 5 10 70
2 6 11 71
7 12 13 72
8 12 15 73
4 11 14 74
3 14 16 75
5 8 11 76
6 9 12 77
7 13 15 78
3 9 22 79
4 10 20 80
0 4 15 81
1 21 23 82
6 13 28 83
2 20 22 84
3 17 29 85
1 8 14 86
9 13 24 87
3 12 25 88
4 22 26 89
5 17 27 90
0 8 10 91
4 9 23 92
2 10 20 93
3 5 22 94
6 15 21 95
3 10 23 96
4 18 24 97
5 11 25 98
6 14 26 99
9 15 27 100
8 13 29 101
7 16 28 102
7 17 19 103
19 25 28 104
21 26 29 105
12 18 27 106
16 20 24 107</td><td>55 5 21 20 1 0
115 15 13 16 0 0
6 146 78 47 0 0
132 107 102 7 0 0
106 126 13 11 0 0
54 131 9 15 0 0
84 127 104 15 0 0
164 41 10 36 0 0
100 64 90 115 0 0
0 107 6 44 0 0
44 11 55 0 0 0
52 55 88 0 0 0
112 3 0 74 0 0
57 8 0 0 0 0
6 38 32 0 0 0
130 18 88 0 0 0
0 109 98 0 0 0
36 93 88 2 0 0
38 0 0 0
139 1 0 0
9 44 0 0
5 172 0 0
31 0 0 0
18 108 0 0
132 0 125 3 0 0
171 0 0 0
0 0 0 0
88 0 0 0
0 170 0 0
0 0 0 0
73 0 0 0
0 11 0 0
0 0 1 0
81 89 0 0
95 0 0 0
9 61 0 0
174 45 0 0
114 142 0 0
153 0 0 0</td><td>122 0 0 0
54 70 0 0
8 68 0 0
168 72 0 0
18 62 43 0
53 109 153 0
154 69 126 0
145 39 43 0
87 57 0 0
86 135 79 0
147 0 0 0
48 47 0 0
94 7 29 0
169 5 20 0
55 162 0 0
114 24 169 0
82 14 12 0
65 80 37 0
135 85 54 0
92 12 79 0
125 81 0 0
41 145 0 0
98 112 132 0
65 0 84 0
160 50 0 0
97 17 159 0
126 167 82 0
9 22 3 0
11 99 79 0
88 29 6 0
86 135 26 0
125 0 166 0
98 82 29 0
109 68 113 0
48 8 166 0
18 62 0 0
11 81 93 0
8 88 147 0
162 70 68 0</td></tr>
</table>

Table 99u Parity-check matrix for RL PFI 08

117 77 2			
40 40 6 6 6 7 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 8 8 8 8 7 7 8 8 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
9 9 9 9 9 9 9 6 5 6 5 6 5 6 5 6 6 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6 5 9 7 7 6 6 6 6 6 6 6 6 7 7 5 5 5 5 5 5 4 4 4 4 6 6 6 6 4 5 5 5 5 5 4 4 4 4 4 4 4 4 4			
0 34 35 36 37 38 39 40 41	1 9 19 29 37 79	82 27 13 20 12 88 0 1 0	122 0 0 22 31 0
1 28 29 30 31 32 33 41 42	0 10 20 30 38 80	125 11 31 33 27 109 38 0 0	172 0 4 0 11 0
0 22 23 24 25 26 27 42 43	1 11 21 31 39 81	148 116 175 39 16 37 7 0 0	23 84 9 48 12 0
1 16 17 18 19 20 21 43 44	0 2 12 22 32 82	78 55 29 105 153 25 0 0 0	0 17 14 13 56 0
0 1 11 12 13 14 15 44 45	1 3 13 23 33 83	95 0 15 29 169 10 61 0 0	46 0 0 0 0 0
0 1 6 7 8 9 10 45 46	0 4 14 24 34 84	107 161 87 151 42 32 7 0 0	0 82 16 0 0 0
0 1 2 3 4 5 20 46 47	1 5 15 25 35 85	83 17 161 70 66 51 44 0 0	89 4 0 85 0 0
0 12 27 35 47 48	0 6 16 26 36 38 86	152 32 61 0 0 0	37 39 8 40 0 0 0
1 19 29 48 49	1 7 17 27 37 39 87	23 131 28 0 0	0 0 32 33 8 52 0
0 15 24 39 49 50	0 6 20 34 88	100 156 16 0 0 0	0 35 74 90 0
1 21 31 50 51	1 7 21 35 89	31 12 42 0 0	0 53 81 89 0
0 4 14 37 51 52	0 8 22 36 90	166 10 82 18 0 0	0 16 29 77 0
1 10 30 52 53	1 9 23 37 91	24 131 0 0 0	0 37 28 49 0
0 2 11 34 53 54	0 10 24 38 92	33 13 115 16 0 0	0 91 45 85 0
1 6 23 54 55	1 11 25 39 93	128 47 26 0 0	0 101 4 131 0
0 5 21 29 55 56	0 12 26 94	120 126 0 88 0 0	0 129 35 0
1 9 25 40 56 57	1 13 27 95	41 52 28 0 0 0	0 51 0 0
0 3 17 38 57 58	0 14 28 96	31 11 5 65 0 0	0 98 174 0
1 14 22 58 59	1 15 29 97	158 44 118 0 0	0 91 6 0
0 7 26 35 59 60	0 2 16 30 32 98	169 130 113 0 0 0	0 6 80 7 42 0
1 16 28 60 61	1 3 17 31 33 99	9 91 31 0 0	0 165 105 30 103 0
0 4 18 36 61 62	0 4 18 32 34 100	22 44 26 0 0 0	0 169 38 116 143 0
1 13 25 62 63	1 5 19 33 35 101	33 1 0 0 0	0 83 30 119 0 0
0 8 19 34 63 64	0 20 34 102	28 59 35 0 0 0	0 40 96 0
1 15 32 64 65	1 7 21 35 103	20 0 6 0 0	0 105 59 21 0
0 6 24 38 65 66	0 8 22 36 104	6 0 103 0 0 0	0 11 10 130 0
1 16 33 66 67	1 9 23 37 105	32 0 10 0 0	0 13 117 73 0
0 3 12 30 67 68	0 10 24 38 106	112 42 0 0 0 0	0 68 102 84 0
1 7 23 68 69	1 11 25 39 107	170 0 88 0 0	0 19 71 27 0
0 8 22 36 69 70	0 12 26 108	20 0 0 0 0 0	0 46 163 0
1 20 33 70 71	1 13 27 109	1 0 0 0 0	0 131 3 0
0 5 18 39 71 72	0 14 28 110	14 0 0 31 0 0	0 111 2 0
1 11 28 72 73	1 15 29 111	125 0 0 0 0	0 106 119 0
0 2 26 37 73 74	0 6 30 112	47 0 0 0 0 0	0 86 28 0
1 9 32 74 75	1 5 19 113	126 88 0 0 0	0 79 133 0
0 1 10 13 17 27 31 40 75	4 18 33 114	0 89 17 113 0 0 0 1 0	91 115 5 0
0 1 5 32 34 38 76	3 17 32 115	71 163 3 10 45 142 0	89 49 0 0
0 1 6 33 35 39 77	2 16 31 116	0 122 63 7 27 26 0	27 67 138 0
0 8 18 28 36 78		161 12 42 25 4 0	